EPIC Support for the UFS

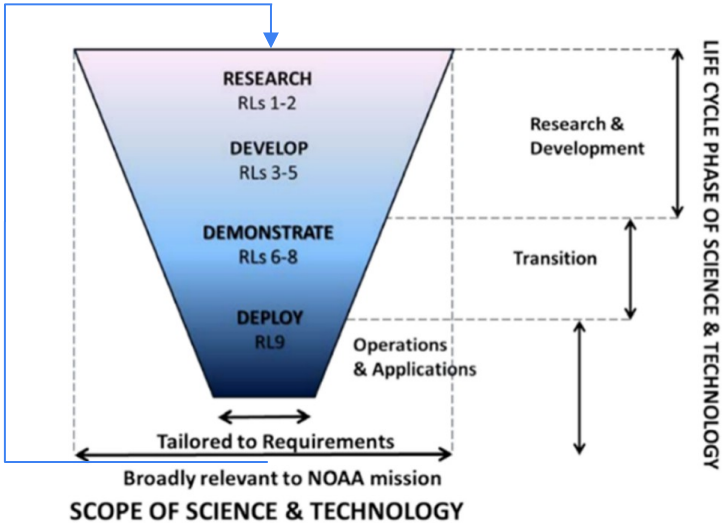
Ways we support the modeling community

- Support releases and the R2O2R pipeline
- Library management
- Port models to new systems
- End user support and training
- Establish development best practices
- Regression testing
- Configuration management guidelines

- Documentation updates

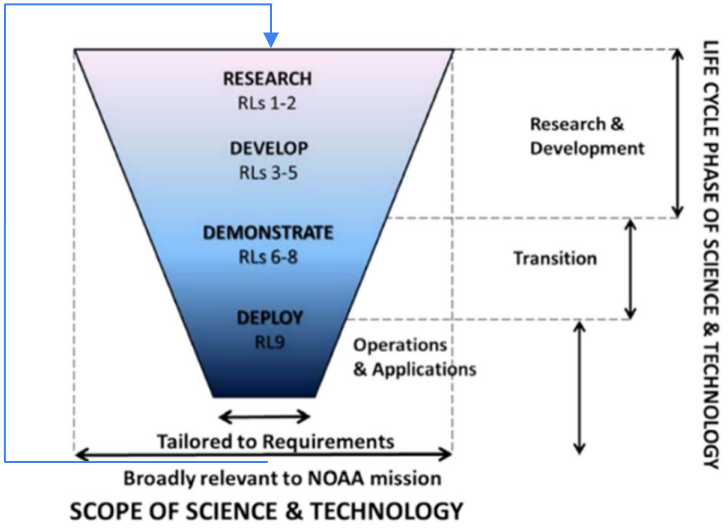
- Model development
- Workflow development
- GSI to JEDI transition
- Community outreach
- Workflow unification

Weather Model Releases



- Bring research to operations and operations to research (R2O2R)
- Allow researchers and operations to coordinate their work
- Transitioning operational applications into the Unified Forecast Model

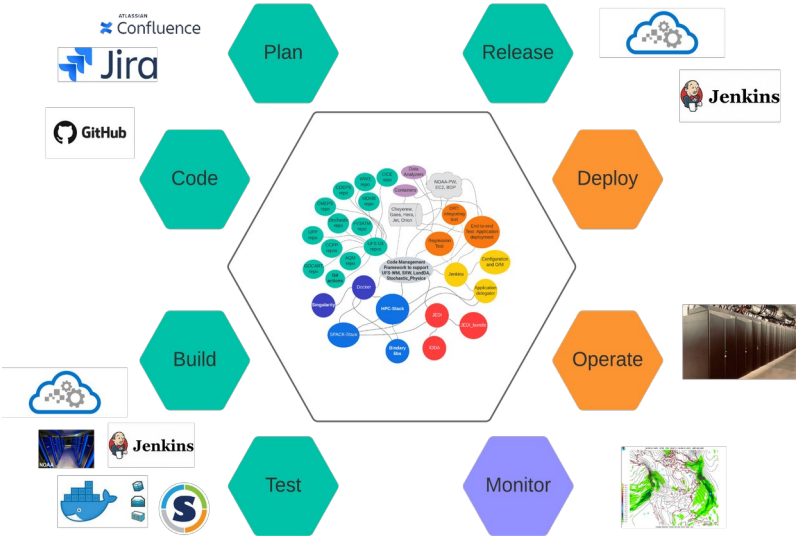
Motivation for Releases



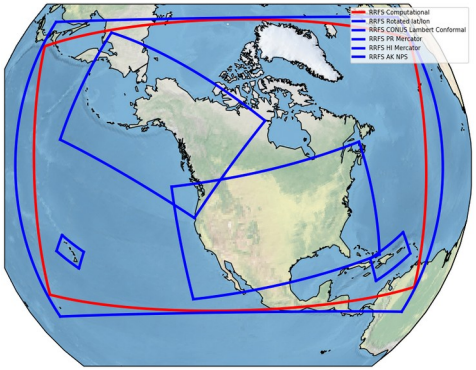
- Transparency about code
- Facilitate research
- Enable contributions back to operations
- Provide operational-ready models for private companies as well as system requirements
- For academia, provide additional scientific documentation for research
- Developers also benefit from releases
  - Documentation updates
  - Enhanced portability
  - Updated/improved testing
  - Hardening of code

CCT Release Vision

- Manage repositories using continuous integration and delivery (CI/CD)
  - Minimize work required to testing, documentation, and training
- Perform releases incrementally to capture
  - New libraries, workflows, etc
  - Significant scientific, testing, or programmatic milestones
    - Operational implementations
    - Coinciding with large scale experiments



Upcoming RRFS and SRW Releases



HRRR
HREF
NAM
RAP

Current Ops

RRFS

Next Gen Ops
Q4 2023

SRW

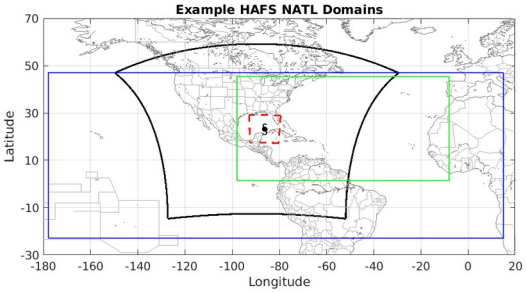
Research
Branches

Upcoming SRW Release

EPIC's Roles

- Coordinate the incorporation of the RRFS capabilities into the UFS Short Range Weather (SRW) App
  - Configuration management, testing, community engagement, documentation
- Incorporate as many RRFS features as possible
- Deploy a set of common libraries (via spack-stack) across platforms for all subcomponents
  - UFS, GSI, Unified Post Processor (UPP), UFS Utilities
  - Upgrade spack/spack-stack capabilities to handle new libraries/evironments
  - Migrate each of these components to the spack-stack unified environment
- 'Fix' the GSI so it will run with newer compilers and migrate it to spack-stack
- Provide demos, training, documentation updates, and end user support

Upcoming HAFS Community Release



HWRF
HMON

HAFS-A
HAFS-B

HAFS

Current Ops

Version 1.0
Operational
2022

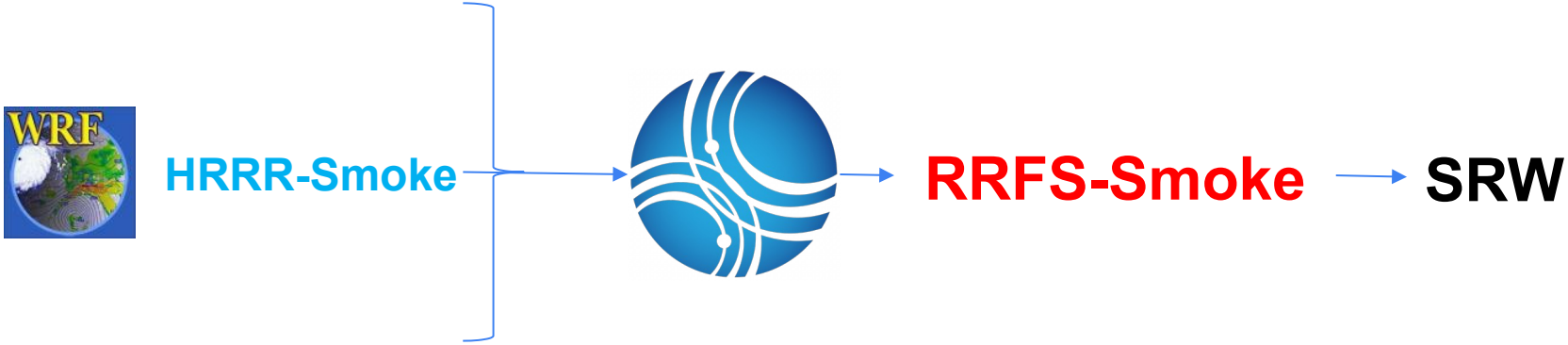
Research
Repository

Upcoming HAFS Community Release

EPIC's Roles

- Take over user support forums
- Regression testing with development
- Create a new branch for community development and research
- Keep the research branch synchronized with new operational features
- Maintain/update scientific documentation, training, and demos
- Host developers' meetings

Upcoming RRFS-Smoke Release



Current Ops

Experimental Release

Research Repository

Upcoming RRFS-Smoke Community Release

EPIC's Roles

- Develop a workflow for the RRFS-Smoke application
  - Merge the workflow into the UFS SRW
  - Port to a minimum of Gaea and the cloud platforms
- Enhance SRW initial and boundary condition generation to include Smoke parameters
- Enable regression testing against the FIREX-AQ field campaign
- Create a new branch and/or repository for community development and research
- Update scientific documentation, training, and demos

Releases in a Nutshell

- Releases enable the community's ability to use and develop various weather applications
- EPIC supports the release pipeline in many ways, including
  - Documentation
  - Demonstrations
  - Workflow development
  - Testing
  - Maintain the R2O2R pipeline
- We appreciate your feedback!
- Take a survey to share your thoughts on releases

Library Management

- Weather applications use many scientific libraries
- Some developed by NOAA, many by external parties
- NOAA-EMC and JCSDA developed separate library deployment systems
  - HPC-stack and spack-stack, respectively
- EPIC manages installs of both on multiple systems and provides testing
- Helping lead effort to transition to the to the newer, more rigorous spack-stack system

CRTM
Community Radiative Transfer Model

HDF

netCDF

METplus

spack-stack
powered by
Spack

User Support

- Provide demos and trainings
  - Building/running UFS models
  - Making use of development tools
  - Using the cloud to run and develop code

EPIC EARTH PREDICTION INNOVATION CENTER

EPIC Workshop

Running the Short-Range Weather App on the Cloud

EARTH PREDICTION INNOVATION CENTER (EPIC)

UFS

Natalie Perlin, AGU 2022

Contributing to UFS/EPIC GitHub Repositories

https://github.com/DavidHuber-NOAA/UIFCW_Demo

EPIC

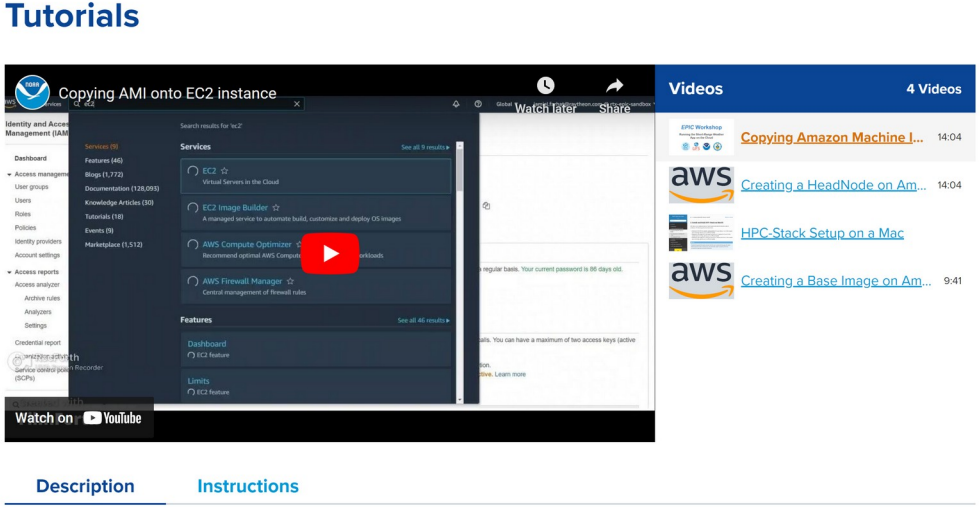
David Huber, UIFCW

User Support

- Provide demos and trainings
- Answer user questions on UFS forums and issues
  - How to acquire data
  - Building and running applications
  - Questions about the model, components, etc
  - FAQ

User Support

- Provide demos and trainings
- Answer user questions on UFS forums and issues
- Video tutorials (epic.noaa.gov/tutorials)
  - Released quarterly
  - Useful topics for new and existing users/developers

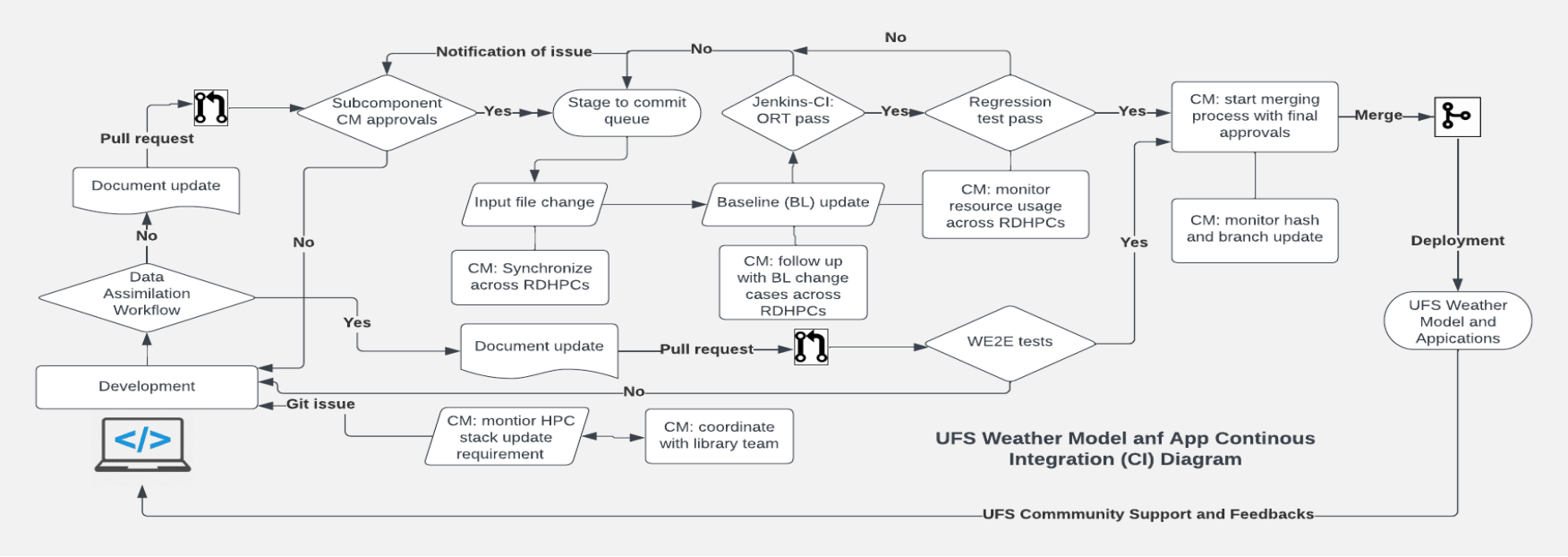


Documentation

- Every update modifies features
- Guides, walkthroughs, requirements are living documents
  - Building, running
  - Contributing
  - Reviewing
- User feedback also leads to documentation updates
- EPIC tech writers collaborate with developers to keep these documents alive and well!

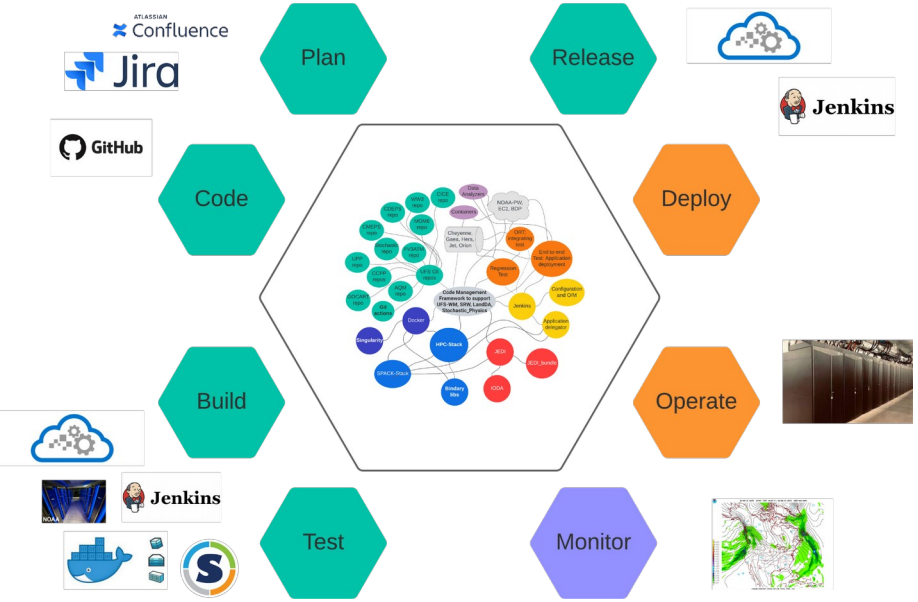
Configuration Management

UFS Code Change Integration Process



Configuration Management

UFS Code Change Integration Process

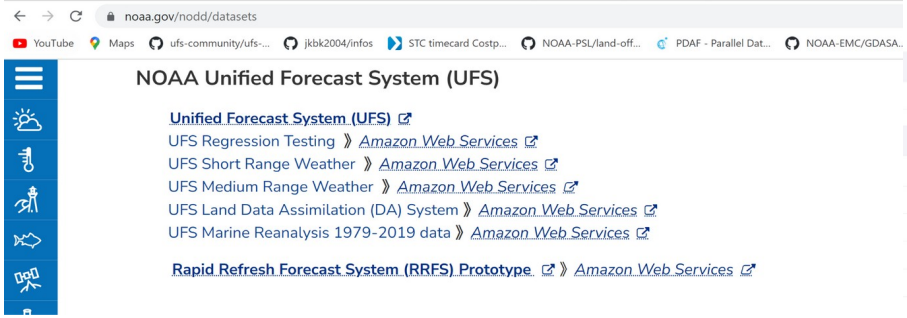


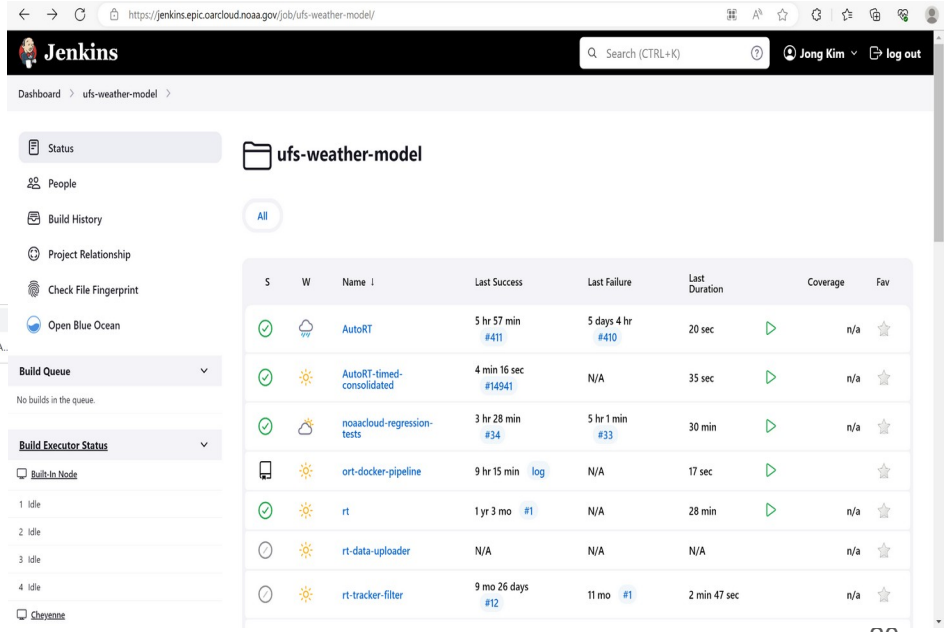
- Ensure code integration and porting to supported Platforms of UFS WM and Apps consistent with subcomponents
- Review and track the PRs daily, identify issues and Conflicts, work with developers
- Ensure the testing framework reflects the latest development and code changes
- Improve the testing framework to efficiently run baseline regression and workflow End-to-End (WE2E) tests
- Standardize DevOps implementation and optimize code Management strategy
- Build and test pipelines and data management tools
- Develop/maintain Docker images and AMIs

Configuration Management

Jenkins Pipelines to support UFS-WM, SRW, and Land DA

- Regression and workflow end-to-end tests across NOAA RDHPCS and Cloud Platforms
- Implemented through Docker and Singularity container approaches
- Cloud data service through NOAA Open Data Dissemination (NODD) to support UFS baseline tests and case studies





Community Outreach

Please take the Release Survey!

- Social Media
  - Twitter (@noaaepic)
  - Facebook (facebook.com/NOAAEPIC)
  - Instagram (@noaaepic)
- Conferences
  - UIFCW
  - AGU
  - AMS
- Website
  - epic.noaa.gov
  - epic.noaa.gov/contact-epic